Gregg W...

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February 21, 2001

Federal Communications Commission's Secretary
Ms. Magalie Roman Salas
Office of Secretary
445 12th Street S.W. TW-A325
Washington, D.C. 20554

Comments of Siemens Corporation
to the "Notice of Proposed Rule Making and Order"
on New Advanced Wireless Services
ET Docket No.00-258

Dear Ms. Salas:

Siemens Corporation is pleased to provide comments in response to the Notice of Proposed Rulemaking (NPRM), ET Docket No.00-258, that examines which frequency bands are needed to support the introduction of advanced wireless services.

Whether it's banking, shopping, trading or travelling, soon more than 200 million people will take care of personal or professional business the mobile way. Looking at the current sales figures in electronic commerce, you can easily calculate the future importance of mobile business. However, the opportunities offered by mobile businesses remain elusive.

Siemens is the only company offering the complete range of mobile business solutions, from converged networks and matching software to a full range of mobile end-user devices and comprehensive professional services to assist in the design, integration and ongoing support of a mobile solution.

The FCC's choice for allocating spectrum is critical to enabling the creation of new markets for IMT-2000 services. These services will provide an exciting new dimension of high-speed mobile multimedia applications, including fast Internet/Intranet access to consumers and business users and change the way the world communicates.

Siemens proposes that the band of 1710-1755 MHz paired with 1805-1850 MHz be selected as a core band in the FDD mode by IMT 2000 systems. This band is designated by the ITU for IMT-2000 and is available in region 2 and in many countries around the world. Cost-effective global roaming will be possible through the introduction of dual-band terminals using this band and the original IMT-2000 core band at 2 GHz.

Siemens Corporation

The strategic advantages of this proposal are:

1. It provides a reasonable paired band of up to 2 x 45 MHz for IMT-2000 to get started in the US and many other countries;
2. It allows compatible international roaming with a growing number out of 60 countries who will use this band from the beginning for IMT-2000 or transform it from 2G to 3G over time;
3. It allows true global roaming with the many countries using the original IMT-2000 core band (1920-1980 paired with 2110-2170 MHz) based on dual-band IMT-2000 terminals enabled by the similarity of the spectrum allocations;
4. It provides the catalyst for an evolution of the 1800 MHz band to another widely accepted IMT-2000 core band; and,
5. It limits the number of paired IMT-2000 core bands to two worldwide and allows cost effective dual-band mobile stations.

In addition, Siemens supports for the USA the use of the 2110-2150/2160-2165 MHz spectrum band and available parts in the 2500-2690 MHz band for TDD (unpaired). This would enable the achievement of high data rates and an efficient transport of the many highly asymmetric applications in densely populated urban areas.

We are grateful to participate in this critically important proceeding and look forward to working with the Commission to help identify the most effective ways to introduce exciting new wireless services to the marketplace.

Sincerely

Gregg Ward
Vice President
Government Affairs

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Notice of Proposed Rule Making to	)	Docket No. 00-258
Allocate Spectrum Below the 3 GHz	)	
for Mobile and Advanced Wireless	)	
Services including Third Generation	)	
Wireless Systems	)	

COMMENTS OF THE SIEMENS CORPORATION IN RESPONSE TO THE NOTICE OF PROPOSED RULE MAKING

Mark Esherick
Director, IT and Telecommunications

Siemens Corporation
701 Pennsylvania Avenue, NW
Suite 720
Washington, DC 20004

Christoph Legutko
Director, Frequency Management

Siemens AG, ICM N BO
Hofmannstr.51
D-81359 Munich
Germany

February 21, 2001

CONTENT

EXECUTIVE SUMMARY

Siemens Corporation is pleased to provide comments in response to the Notice of Proposed Rulemaking (NPRM), ET Docket No.00-258, that examines which frequency bands are needed to support the introduction of advanced wireless services.

Whether it's banking, shopping, trading or travelling, soon more than 200 million people will take care of personal or professional business the mobile way. Looking at the current sales figures in electronic commerce, you can easily calculate the future importance of mobile business. However, the opportunities offered by mobile business remain unrealized for many.

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The FCC's choice for allocating spectrum is critical to enabling the creation of new markets for IMT-2000 services. These services will provide an exciting new dimension of high-speed mobile multimedia applications, including fast Internet/Intranet access to consumers and business users and change the way the world communicates.

Siemens proposes that the band of 1710-1755 MHz paired with 1805-1850 MHz be selected as a core band in the FDD mode by IMT 2000 systems. This band is designated by the ITU for IMT-2000 and is available in region 2 and in many countries around the world. Cost-effective global roaming will be possible through the introduction of dual-band terminals using this band and the original IMT-2000 core band at 2 GHz.

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3. It allows true global roaming with the many countries using the original IMT-2000 core band (1920-1980 paired with 2110-2170 MHz) based on dual-band IMT-2000 terminals enabled by the similarity of the spectrum allocations
4. A US adoption will be the catalyst for an evolution of the 1800 MHz band to another widely accepted IMT-2000 core band
5. It limits the number of paired IMT-2000 core bands to two worldwide and allows cost effective dual-band mobile stations.

In addition, Siemens supports for the USA the use of the 2110-2150/2160-2165 MHz spectrum band and available parts in the 2500-2690 MHz band for TDD (unpaired). This would enable the achievement of high data rates and an efficient transport of the many highly asymmetric applications in densely populated urban areas.

We are pleased to participate in this critically important proceeding and look forward to working with Commission to help identify the most effective ways to introduce exciting new wireless services to the marketplace.

Siemens offers detailed information in this document. If you have any further demand for information please do not hesitate to contact us.

INTRODUCTION,

Who is Siemens?

The "Information and Communication Mobile" Group at Siemens AG , the Creator of New Advanced Wireless Services and Products

The Information and Communication Group covers the entire spectrum of mobile communications business with terminals, network infrastructure and solutions. For fiscal year 2000, IC Mobile recorded sales of $8.3 billion and an EBIT of $700 million (preliminary figures). The Group had 27,400 employees at the end of September 2000 and is structured in three **Divisions: Devices, Networks and Solutions**.

Actually 30 out of about 75 UMTS licensees in Europe have announced their supplier decision. Winning 10 contracts (as of 12.01.2001), Siemens has achieved the number two position in Europe.

Devices Division: The Siemens Information and Communication Mobile Group offers a complete range of mobile telephone products including devices, infrastructure and applications. Devices include mobile phones, ISDN phones, mobile organizers, cordless phones and products for wireless home networks. The infrastructure portfolio includes the complete range of network technologies from base stations and switching systems to applications and intelligent networks. More information is available at: http://www.icm.siemens.com.

Networks Division: More than 170 international customers - most of them mobile communication network operators - rely on the competitive solutions for digital cellular networks and intelligent network services from the Networks Division. Every third GSM phone call today is set up using Siemens technology. Even in the field of prepaid services, the Division holds a leading market position worldwide. With network solutions for HSCSD and GPRS, Networks Division has already opened up the market for the mobile Internet for more than 15 mobile communication operators.
Together with the Japanese NEC Corporation, the Division is currently setting up the first commercial UMTS network in Europe for MANX Telecom on the Isle of Man.

Solutions Division: The new Solutions Division offers mobile operators, service providers and enterprises applications, middleware and solutions for mobile business. The offer focuses on Location Based Services based on WAP. The first location based info service in Asia was implemented in co-operation with Hutchison for the Hong Kong trade fair. In addition, the Division is developing innovative UMTS services for Unified Messaging or for payment transactions via mobile phone (Mobile Commerce).

More information can be found at: http://www.ic.siemens.com/mobile

Siemens in the United States

The United States became the single largest market for Siemens world-wide as U.S. orders surpassed all other countries for the first time in 2000. For last fiscal year (Oct. 99 to Sept. 00), Siemens Corporation, the holding company for Siemens' operations, recorded U.S. sales of 15.2 billion US $ by all consolidated companies plus export sales of 1.2 billion US $. With over 75,000 employees, Siemens is among the top multinational employers in the United States, as well as a leading R&D engine, with expenditures of $785 million in total. Siemens has more than 650 facilities in all 50 states, with more than 100 of them manufacturing facilities.

The information and communications sector provides integrated voice, data and video communications networks to carrier, service provider and enterprise customers. It serves some of the premier carriers, including BellSouth and MCI WorldCom, and provides innovative networks and call center solutions to companies such as Coca-Cola, Ford, Bayer, Oracle, 3M and IBM, among others.

In 2000, Siemens successfully continued to penetrate the emerging market of new competitive carriers by installing a leading-edge wireless solution for WinStar Communications' end users. This Siemens' solution delivers two-way, high-speed data, video and voice services, as well as Internet access. In addition, Siemens designed and implemented a seamless converged voice-data network utilizing a packet-based technology for key customer, 2nd Century. In February, Siemens unveiled its SURPASS solutions for carrier-grade voice-data integrated services, incorporating the intelligence and reliability of real-time voice networks into converged packet based networks. For enterprise customers, Siemens unveiled its HIPATH strategy for next-generation enterprise IP (Internet Protocol) communications.

The Information and Communications Mobile Group established its new U.S. headquarters with research and development facility for mobile phones in San Diego, California. Other main locations for the Siemens ICN Division in the US are: Boca Raton (Florida), Boston and Denver.

In addition Siemens has major US business activities in automation and control, power, transportation, medical and lighting.

A Global Leader in Electronics and Engineering

Our global organization is represented by 500 manufacturing and assembly facilities in 42 countries, subsidiaries and affiliates in more than 190 countries and over 440 000 employees world-wide.

E-Business on the Move, a key Enabler of New Advanced Wireless Services.

Whether it's banking, shopping, trading or travelling, soon more than 200 million people will take care of personal or professional business the mobile way. Looking at the current sales figures in electronic commerce, you can easily calculate the future importance of mobile business. However, the opportunities offered by mobile business remain un-captured for many, thus highlighting the importance of intelligent and integrated solutions.

Siemens is the only company offering the complete range of mobile business solutions, from converged networks and matching software to a full range of mobile end-user devices and comprehensive professional services to assist in the design, integration and ongoing support of your mobile solution.

More information can be found at: http://www.siemensmobilebiz.com/about.html

Siemens a Key Actor in 3G Pre-competitive global Activities on Spectrum

Siemens strongly believes in the concept of New Advanced Wireless Services. Siemens is an active player and contributor to standardization in 3GPP, 3GPP2, TIA, ANSI and ETSI. A co-operation in order to make the necessary spectrum available as enabler of future growth is in the center of our concern. That is the reason why Siemens was actively involved in the creation of the UMTS Forum and especially its Spectrum Aspects Working Group. Siemens provided the Chair of this group for four first years. During this time the industry consensus first in Europe was built on the spectrum needs for unhindered growth in advanced wireless services. This included all aspects of demand calculations: total demand as well as minimum spectrum needed per operator. But also the possibilities to cover this demand were analyzed. This included both the

proposal of new bands and re-farming of existing bands used for mobile services. Our seniors Executives were also involved in the WARC 2000 preparation process.

This work led to several reports, which can be found at the web site of the UMTS Forum, the titles are mentioned in the attached list with reference documents. Especially relevant are the reports no. 5 and 6

More information can be found at: www.UMTS-Forum.org

SIEMENS RESPONSE TO FCC DOCUMENT NPRM 00-455

Our comments are only on a set of particular topics from NPRM 00-455.
In order to structure our comments and answers better, we have numbered the questions in some paragraphs.
The FCC document is copied in cursive.

NPRM §§1-19, General spectrum allocation issues

Siemens Comments on §§1-19:

Noted

NPRM §20, Advanced wireless services

To determine the amount of additional spectrum that may be needed to be allocated for advanced mobile and fixed communications services, we first must understand the types of advanced services that wireless providers now offer and anticipate offering in the future. We seek comment on the types of data services currently being offered to the public and projections for new service offerings.

1. *What is the current demand for these services, and what are projected demand and growth rates?*
2. *What percentage of future offerings will be for fixed service and mobile service?*
3. *What technological limitations currently exist to providing advanced services?*
4. *Over what time period(s) do service providers plan to introduce certain new services?*
5. *What market studies have been conducted to guide these plans?*
6. *Based on projected demand for advanced wireless services, how many licensees are needed to accommodate market demand?*

Siemens Comments on § 20:

General Aspects of New Advanced Wireless Services

The **New Advanced Wireless Services will enable the mobile information society.** The access to corporate Intranets and the public Internet is of paramount importance. On top of the familiar 2G services, users will enjoy a wide variety of new advanced services like

- multimedia messaging, an advanced form of the present short messages containing pictures, short video clips or short audio pieces
- high speed circuit/packet switched data services needed for download and upload of information of all types e.g. from/to the Internet or from/to Intranets
- multimedia services: one "session" contains several types of information, they may change during one "session", real-time or non-real-time transmission
- "streaming" like download of video films or audio files (e.g. CDs)
- video telephony

Some **trends** are visible

- higher data speeds are needed for a fast response and fast transmissions of high data volumes
- change of information types during a "session"

- high degree of asymmetry in most communications: in a typical Internet session the download volume is typically an order of magnitude larger than the upload volume1
- highest bitrates and highest asymmetry are needed in densely populated urban areas for users with pedestrian speeds

Consequences are:
- much more new spectrum is needed (ITU consensus: 160 MHz)
- paired spectrum for wide area symmetric or moderately asymmetric applications
- unpaired spectrum mainly for densely populated urban areas to be used by TDD mode for high bit-rates and high flexibility (variations of symmetry)

Several **market studies** confirming these trends are available in the public domain e.g.
- UMTS Forum Report No. 8 and 9, www.umts-forum.org
- USA, "Initial Market Demand Forecast for Terrestrial IMT-2000 Services", ITU-R Document 8-1/87-E of 24 April 98

Siemens Comments on § 20 Question 1:

The current & projected demand, growth rates

Siemens End-User Survey

Methodology of the survey

Regarding future mobile services, Siemens did a 1 year market observation and analysis. By computer aided telephone interviews 11.000 end-user were asked in 11 European countries in between October 1999 and November 2000. The Siemens' survey results in the following table are presenting the current demand for new service categories.

Table 1
Demand for new service categories

Category	Users requesting service	Revenue
Information: e.g. location, traffic	28,0 %	31,2 %
Entertainment	11,7 %	9,6 %
Communication: video telephony, messaging	26,7 %	21,4 %
Commerce: booking, micro-payment, banking, shopping	24,9 %	19,3 %
Mobile Office	8,7 %	18,5 %

Note: The survey results as shown combine 70% residential consumers and 30% business consumers

Services preferred by consumers

The highest consumer acceptance (50 % or more) had:
- Map based local information
- Map based traffic information
- Multimedia booking and reservation

[1] This can also be observed in the Internet access from fixed networks. In the fast access technology ADSL the most popular bitrates are 768(download)/128(upload) kbit/s.

- On line banking
- Product and price locators
- Control of household appliances
- Video telephony
- Multimedia messaging
- Mini newspaper

For young consumers (< 26) audio and video clips and interactive games were very popular in addition.

Services preferred by business users:
75 - 80 % of the business users preferred:
- Fast Internet and Intranet access via a notebook
- Map based traffic information

65 % of the business users liked:
- Map based local information
- Personal organizer

Around 50 % of the business users requested:
- Video conferencing
- Mini newspaper
- Online banking
- Multimedia booking and reservation
- Fast Internet/Intranet access via mobile device

Charging

- There was a high preference for variable charges (i.e. not much interest in a flat rate).
- Paying per event was preferred over paying per minute.
- More than 50 % of the users would accept advertising to reduce prices for usage.
- Consumers showed a willingness to pay 28 €$ on top of their 40 €$ monthly bill.
- Business users were willing to add 47 €$ to their 110 €$ bill.

The future demand for services world wide and in North America was investigated in the UMTS Forum, where Siemens contributes to a large extend (see UMTSF Rep. No. 9). Thus - the expected future demand for three service categories are given below: The service category infotainment includes information and entertainment applications, multimedia messaging includes e-mail, SMS, instant messaging, unified messaging and Intranet access includes mobile office and all kinds of Tele-working.

Table 2
Demand for future services in USA

	2005 [Millions of users]	**2010** [Millions of users]
Infotainment	5	22,6
Multimedia messaging	4,6	20,7
Intranet access	9,2	89,1

Source UMTS Forum

The forecast figures for Internet access and voice telephony as well as for location based services are presently under investigation and will be published soon.

On the other hand, the main demand for high bit rate unsymmetrical services is expected in the hot spots covered by micro and pico cells. In such areas the business customers are concentrated with a potentially high acceptance of new services and willingness to spend money for them. For operation in such an environment TDD is better suitable than FDD. Unfortunately there is not enough spectrum allocated for TDD up to now. This can decrease the ability of operators to offer highly profitable services to finance their 3G investments. Probably the main demand for high bit rates unsymmetrical services will emerge some years after the launch of 3G networks. Then should be more spectrum available for example in the extension band at 2.5 GHz.

Siemens Comments on §27, Questions 2-5:

Other requirements

The most of asked topics are discussed in the ITU Document 8/80-E: SPECTRUM REQUIREMENTS FOR IMT-2000, 26 April 1999.
Siemens position is in line with this document.

NPRM §28, Additional spectrum

1. *How much additional spectrum will be needed to satisfy unmet and projected mobile requirements such as toll-quality voice, high-speed data including Internet and other multimedia applications, and full-motion video?*
2. *What size spectrum blocks would be appropriate to implement advanced wireless systems?*
3. *What is the minimum spectrum block size needed?*
4. *When will additional spectrum be needed?*

We note that whether spectrum is clear, shared, or segmented may impact the amount of spectrum required, and the amount of spectrum that may be made available. Commenters should be mindful that the total amount of spectrum and the size of spectrum blocks will affect the amount of competition that could be introduced in the provision of advanced wireless services.

Siemens Comments on §28, Question 1:

Amount of additional spectrum

The UMTS Forum's Report No.6 provides an analysis based on six services for 3rd Generation mobile networks: High interactive Multimedia, Medium MM, High MM, Switched Data, Single Messaging, Speech. This discussion is based on assumptions for the mobile market in the 15 countries of the European Union (EU15). Concerning the population and market requirements the USA and EU15 could be considered as similar. This results in the same traffic asymmetry ratio for up- and down link.

For **speech services** (symmetric) the bandwidth demand was estimated to be approximately 2 x 107 MHz in the year 2005 and 2 x 115 MHz in the year 2010 for 2G and 3G.

For **data services** (high multimedia, medium multimedia, switched data, simple messaging, high interactive multimedia) the bandwidth demand will be approximately 102 MHz (UL: 1 MHz, DL: 101 MHz) in the year 2005 and 227 MHz (UL: 2MHz, DL 225 MHz) in the year 2010. (Region 1)

For Region 1, as shown in the Table 5 above, the services in USA (speech, simple messaging and switched data) require 174 MHz of spectrum (symmetric), the new services (medium multimedia, high multimedia and highly interactive multimedia) require 216 MHz.

As 230 MHz presently estimates the available spectrum for mobile applications, the additional spectrum needed to cover new services (highly asymmetric) is in total 160 MHz.
Siemens is in line with those figures agreed within ITU-R and does not see the need for updates at present.

Siemens Comments on §28, Question 2:

Minimum size of spectrum blocks

Most IMT-2000 systems require a minimum of 5 MHz. Therefore a minimum spectrum block size used in the spectrum allocation should be 5 MHz. But this is only the granularity of the allocation.

Siemens Comments on §28, Question 3:

Sufficient size of spectrum block

The UMTS Forum considers that 2x15 MHz + 5 MHz (FDD + TDD) is the preferred minimum allocation per operator (see Report No. 5). This takes into consideration a relatively even traffic distribution between the hierarchical cell layers and that TDD is the most efficient method to handle asymmetric traffic.

The 2 x 15 MHz (FDD) would be technically sufficient to allow a UMTS service to start up and offer the full range of services envisaged at this time, but may not allow a flexible deployment of hierarchical cells.

It has been shown that from a purely technical point of view the minimum spectrum requirement (by definition) is 2x10 MHz (FDD) + 5 MHz (TDD). This scenario provides sufficient capacity to carry the projected traffic for Europe and the full range of UMTS services, but may not provide a flexible deployment of hierarchical cells. There may be problems delivering high data rate services in some areas.

NPRM §29, FDD/TDD for Advanced Wireless Systems

Different technologies will use bandwidth in different ways, and we invite commenters to address the spectrum requirements needed to deploy various technologies. For example, frequency division duplex ("FDD") systems use different frequencies for upstream and downstream transmissions. To accommodate the duplexer device, some amount of frequency separation is needed between these two paths. Alternatively, in TDD systems, the same frequency is used for both upstream and downstream traffic. The IMT-2000 radio interfaces, discussed above, incorporate both FDD and TDD technologies. We thus seek comment on the following issues.

1. *What are the relative merits of FDD and TDD for advanced wireless systems (e.g., spectral efficiency, backward compatibility, capacity limitations, cost to deploy)?*
2. *Do service providers anticipate implementing either FDD or TDD systems, or will both types of systems be implemented?*
3. *We note that many of the spectrum allocations that have already taken place in Europe for 3G services have included both paired and unpaired spectrum. Do service providers anticipate that both are needed in the United States?*
4. *If both types of systems must be supported, what limitations exist at the boundaries between paired and unpaired spectrum blocks (e.g., guard bands)?*
5. *What steps can be taken to minimize these limitations?*
6. *For paired frequency bands, how much frequency separation is needed to enable FDD operation?*
7. *Can TDD operate in the region between the FDD forward and reverse links?*

Siemens Comments on §29, Question 1:

Relative merits of FDD and TDD

There is principally no basic difference between the spectrum efficiency of the FDD and TDD modes. If FDD should be used for serving applications with asymmetrical ratio between forward and reverse link it's spectrum efficiency is worse than the efficiency of TDD.

In the FDD mode the different transmission directions are separated in the frequency domain in two separated sub bands, normally having the same bandwidth. Therefore the FDD is suited only for serving symmetrical applications for wide area coverage and high mobility. Some FDD standards support also asymmetric applications however the asymmetry ratio is fixed and limited to the bandwidth ratio of reverse and foreword link.

In the TDD mode both transmission directions use the same single piece of spectrum but are separated in time. Transmission is accomplished in radio frames providing 15 basic time slots. Asymmetric traffic requirements can be met in principle flexibly over a wide range by allocating the time slots to forward link and reverse link as required, from 2/13 to 14/1. The so-called switching point(s) in the frame separate reverse link and forward link information in time. TDD is expected to be used for high data rate unsymmetrical applications in micro and pico cells with low and medium mobility.

The FDD mode uses direct sequence wide-band CDMA; the TDD mode uses a combination of TDMA and CDMA. The chip rate characterizing the bandwidth of the radio signal is 3.84 Mcps for both modes. The application of CDMA in these radio interfaces results in significant differences in the behavior of these 3G systems compared to TDMA based 2G systems (such as GSM or ANSI136). In CDMA based cellular systems individual data links between the central base station and different mobile user stations rely on signals spread over the full channel bandwidth by specific and different codes. In the wide-band CDMA receiver the wanted signal is recovered by a correlation process. All other signals contribute as interference and are suppressed in principle. In the case of TD-CDMA advanced detection schemes such as joint detection can be applied to remove interference.

The moving speed of the mobile user up to 65 mph can be fulfilled with the FDD and TDD. FDD is only needed for speeds up to 312mph.

The multi-mode terminals secure backward compatibility. Such developments are actually in progress.

The system capacity will be only limited by available frequency spectrum, which is always to few, as well known. Therefore it seems to be existentially important to use it as effective and flexible as possible.

Please also compare the radio system capacity from Table 6 with the required capacity shown in Table 7:
One operator with 2x15+5 MHz can provide a radio system capacity of ca. 12,8+10,3 Mbps/km2 (DL+UL). Looking in the Table 7 we can see the capacity requirement of 45,7+22,3 Mbps/km2 (DL+UL) for year 2005 and of 133+40 Mbps/km2 (DL+UL) for year 2010. It means that one operator can cover about 25% of total traffic demand in year 2005 and ca. 10% in year 2010 if his spectrum bandwidth and that network parameter remain unchanged. The operator can of course decrease the cell area, but this is limited by increasing of the network total costs. After optimizing his network, the operator will still need more spectrums for satisfying his customer.

Table 6
3G Radio System Capacity relative to Frequency Bandwidth

IMT-2000/UMTS in Core Band	Frequency Bandwidth 2 x paired + unpaired [MHz]	Radio System Capacity x) DL + UL ~ Total [Mbps/km^2]
Minimum per operator	2 x 10	6,5 + 6,5 ~ 13
Medium per operator	2 x 10 + 5 2 x 15	9,5 + 6,8 ~ 16,3 9,8 + 9,8 ~ 19,6
Maximum per operator in Europe	2 x 15 + 5	12,8 + 10,3 ~ 23
Maximum per operator in Japan and Korea	2 x 20	13 + 13 ~ 26

The above table is calculated with ITU methodology
x) Spectral Efficiency = 180 kbps/MHz/cell
Urban sector cell size 0,3 km omni-directional

The deployment costs depend on cell area. TDD may benefit from the exclusive use for low mobility applications due to its higher spectral efficiency in such a case.

Siemens Comments on §29, Question 2:

Implementing of FDD or TDD systems

Up to now about 80 3G licenses were issued in the core band worldwide. About 60 of these licenses include unpaired spectrum for use by TDD, mainly in Europe. It may be conducted the operators will use oth FDD and TDD.

Without going much into the details future user profiles (or user classes) can be described as follows:
- Mobile users who travel by car, train, etc. will require full area coverage (in macro- and micro-cells) mainly for telephony and short messages/info using e.g. PDA's. They will rather accept relatively low data rates.
- Users moving slowly outside of their offices and needing high data rate services e.g. for presentations, internet and video applications will accept some mobility limitations in pico cells.

The dependencies between spectrum, network structure, user profile and required bit rates can be described as follow:
a) The macro-cells and FDD implemented in core band will be used for full area coverage. In this environment the high mobility with low and medium bit rates (<144 kbit/s) will be required.
b) The micro-cells and FDD or TDD implemented in core band will be used for preferably full area coverage. In this environment the medium mobility with medium and high bit rates (<384 kbit/s) will be required.
c) The pico-cells in high-density areas with preferable TDD implemented in core band or if available in extension band will be used for hot spots coverage. In this environment the low mobility with high bit rates (<2.000 kbit/s) will be required.

Therefore it can be assumed that the service providers will anticipate implementing both of FDD and TDD types from begin on of the 3G systems. TDD is expected to be use for high data rate unsymmetrical applications in micro and pico cells with low and medium mobility. Such service concentration in the crowded business areas will bring high revenues and margins. It will help to balance the costs caused by high power equipment necessary for achieving of wide area coverage.

Siemens Comments on §29, Question 3:

Paired and unpaired spectrum in the United States

Considering the discussion for question 2, it can be assumed that also the US operators will benefit from deployment of both modes FDD and TDD similar to the rest of the world.

Siemens Comments on §29, Question 4:

Boundaries between paired and unpaired spectrum blocks

Both technology types, FDD and TDD, should be supported. FDD is advantageous for wide area coverage in macro and micro cells with high and medium mobility, low and medium bit rates for symmetrical applications. TDD allows to serve cost effectively the hot spots in micro and pico cells with low and medium mobility, high and medium bit rates for preferably asymmetrical applications. Those advantages should keep balance with limitations caused mainly by interference. The possibility of co-siting is considered and some spatial separation between the base stations of FDD and TDD will be necessary. The guard bands can be avoided by additional filtering.

Siemens Comments on §29, Question 5:

Minimizing of limitations

The new 3G system specific network design tools will support the network planer to find the optimum. Tools will take into consideration not only the local topography or number of local active operators but also the technical parameters of actual equipment generation.

Siemens Comments on §29, Question 6:

Frequency separation to enable FDD operation

To allow a cost-effective implementation of 3G systems, the minimum duplex separation between the forward and reverse link should be not less and preferably slightly higher than in existing 2G implementations. The situation may change when advanced RF filter technologies will become optimized and mass article.

Siemens Comments on §29, Question 7:

Can TDD operate in the region between the FDD forward and reverse links?

There is no reason for preventing the TDD operation in the region between the FDD forward and reverse link however this is not the preferable or only place for TDD. No differences between coexistence of TDD and FDD in the adjacent channels as at 1920 MHz in the core band and coexistence of TDD and FDD at any frequency if TDD operates in the duplex gap between FDD reverse and forward links can be principally seen.

NPRM §§30-49, Frequency Bands

Siemens Comments on §§30-49:

Noted

NPRM 50 – 57, 2110-2150 MHz and 2160-2165 MHz

NPRM §50,

These bands, which are allocated in Region 2 on a primary basis to the Fixed and Mobile Services, have been used in the United States for a variety of services. These bands were identified by the Commission in 1992 for reallocation to services using new and innovative technologies under its Emerging Technologies proceeding. In November 1998, the Commission proposed that portions of the 2110-2200 MHz band be reallocated as follows: the 2110-2150 MHz band would be allocated to the Fixed and Mobile Services for assignment by competitive bidding, the 2160-2162 MHz band would be allocated for shared use by the Multipoint Distribution Service ("MDS") and Instructional Television Fixed Service ("ITFS") and fixed microwave use, and the 2162-2165 MHz band would be allocated for fixed and mobile emerging technologies. In its 1999 Policy Statement, the Commission stated its intention to initiate a separate proceeding to propose using these bands for advanced mobile and fixed communication services. BBA-97 requires reallocation of the 2110-2150 MHz band and assignment by competitive bidding by September 30, 2002.

NPRM §51

Currently, these bands are used primarily for non-Federal Government Fixed and Mobile services licensed under either the Fixed Microwave Service in Part 101 of the Commission's Rules or the Public Mobile Services under Part 22 of the Commission's. We note that many of the stations were licensed subsequent to the Emerging Technologies First Report and Order in 1992 and have secondary status. Additionally, licenses of stations with primary status that made major modifications were converted to secondary status.

- *The 2110-2130 MHz portion of the band supports 3,454 common carrier point-to-point licenses (Part 101), three private non-public safety point-to-point licenses (Part 101), 56 Paging and Radiotelephone Service licenses (Part 22), 47 Local Television Transmission Service Licenses (Part 101), and one General Aviation and Air-Ground Radiotelephone license (Part 22). Use by Part 22 licensees is limited to point-to-point control and repeater operations for paging systems. Some licensees have paired spectrum at 2110-2115 MHz with spectrum at 2610-2165 MHz.*

- *The 2130-2150 MHz portion of the band supports 2448 private non-public safety point-to-point licenses (Part 101), 1326 public safety point-to-point licenses (Part 101), and two common carrier point-to-point licenses (Part 101). Channels in the 2130-2150 MHz band are paired with spectrum in the 2180-2200 MHz band.*

- *The 2160-2165 MHz band supports 890 common carrier point-to-point licenses (Part 101), 13 Paging and Radiotelephone Service licenses (Part 22), and 40 Local Television Transmission Service Licenses (Part 101). The 2160-2162 MHz segment also is used for MDS in the top 50 markets.*

NPRM §52

The 2110-2150 MHz and 2160-2165 MHz bands are currently allocated to the Fixed, Mobile, and Space Research (Deep Space) services. We are not proposing to change this allocation. Instead, we are proposing that incumbent users of these bands (excluding the Space Research service) be relocated, if necessary, and the band be designated for the provision of advanced mobile and fixed communications services. We seek comment on this proposal.

NPRM §53

The band segment 2110-2120 MHz is also allocated via US252 to the Space Research service on a primary basis and is used by NASA's Deep Space Network (DSN) at Goldstone, California for uplink transmissions to interplanetary spacecraft. Internationally, the band is allocated in all three ITU Regions to the Fixed, Mobile and Space Research

(deep space) (Earth-to-space) services and is used by NASA at DSN facilities in Spain and Australia. In order to ensure link integrity over interplanetary distances, the DSN employs earth station transmit powers up to 400 megawatts. During command link operations it is likely that service disruption would be experienced by mobile receivers when attempting to operate within the areas surrounding Goldstone. Additionally, considering the high transmit powers used at the site, the potential exists for adjacent band interference in bands above 2120 MHz. The Commission notes that the Australian government, faced with a similar situation, excluded the 2110-2125 MHz portion of the spectrum in areas around the DSN facility at Canberra in a recent auction of spectrum for IMT-2000. We seek comment on these and other issues relating to sharing the band with the Space Research service.

NPRM §54

In the 2110-2150 MHz and 2160-2165 MHz bands, fixed microwave service incumbents are entitled to compensation for relocation to other frequency bands under the policies adopted in the Emerging Technologies proceeding for incumbent fixed users in the frequency bands reallocated for broadband PCS. Specifically, fixed microwave service incumbents are entitled to compensation for relocation of any links that may pose an interference threat to new fixed or mobile system licensees, including all engineering, equipment, site, and FCC fees. Also, the new licensees must complete all activities necessary for implementing the replacement facilities, including engineering and cost analysis of the relocation procedures, and must test the new facilities to ensure comparability with the existing facilities. We note that the Commission recently modified some of the relocation procedures for incumbent Fixed users at 2165-2200 MHz in order to accommodate the entry of the MSS in that band. Because channels at 2165-2200 MHz are paired with spectrum at 2110-2115 MHz, we also adopted a new procedure on reimbursement of relocation costs that will apply to those paired links at issue in this proceeding that are relocated as a result of MSS entry in the higher band. The new procedure takes into account that different new licensees may be responsible for relocating each half of a channel pair for a given incumbent licensee. Consequently, it is possible that a new entrant in the 2110-2150 MHz band could be assigned spectrum that would have two sets of relocation procedures in effect.

NPRM §55

We thus propose to use the modified relocation procedures (i.e., those designated for fixed microwave service incumbents in the 2165-2200 MHz and 2110-2115 MHz bands) for any incumbent user of the 2110-2150/2160-2165 MHz bands, including MDS entities at 2160-2162 MHz. We seek comment on this proposal. We also invite comment from MDS/ITFS licensees on the current and planned use of the MDS channels 1, 2, and 2a in the 2150-2162 MHz band. Because the 2150-2162 MHz spectrum was not the focus of the FCC Interim Report, we ask the MDS/ITFS licensees to discuss the use of those channels in their business plans in conjunction with the channels in the 2500-2690 MHz band. In particular, we ask MDS/ITFS licensees what effect reallocation or relocation of the 2150-2162 MHz band would have on their current and planned use of the spectrum. We also invite comment from other interested parties on the current and future use of the 2150-2160 MHz band since this band is adjacent to the 2110-2150 MHz and 2160-2165 MHz bands.

NPRM §56

In the Emerging Technologies proceeding, we reallocated the 4 GHz, 6 GHz, 10 GHz, and 11 GHz microwave bands to provide that private and common carrier fixed wireless users, and fixed satellite users, where appropriate, would each have co-primary status. This action was taken to provide spectrum relocation options to incumbent users. We realize that this action was taken over seven years ago and spectrum use has changed since that time. Additionally, because spectrum coordination is accomplished by industry, we are not in a position to determine the number of frequency coordination conflicts that arise when new stations are proposed in any of these frequency bands. However, we believe that many of the incumbents in the 2110-2150 MHz and 2160-2165 MHz bands can be accommodated in the 4 GHz, 6 GHz, 10 GHz, and 11 GHz bands. Additionally, we note that relocation is not strictly a spectrum issue. Incumbents can be relocated using other mediums, such as fiber, and our relocation policies take this factor into consideration in allowing for the provision of comparable facilities. We seek comment on the various relocation options that exist for incumbents in the affected bands.

NPRM §57

Finally, we note that the 2110-2150 MHz bands must be auctioned by September 30, 2002. Due to similarities in allocation, usage, and current licensing, we propose to auction the 2160-2165 MHz band in this same timeframe. We request comment on this proposal.

Siemens Comments on §§50-57:

2110-2150 and 2160-2165 MHz

Siemens proposes to the FCC to allocate the bands 2110-2150 and 2160-2165 MHz for New Advanced Wireless Services, i.e. IMT-2000 services. This band should be used for TDD applications in order to enable high data rate and highly asymmetric applications in densely populated urban areas.

This spectrum is a part of the original worldwide IMT-2000 core band designation by the ITU.
Siemens sees no reasonable possibility for pairing of this band with other bands (see our comments on §§ 66-69 pairing options).

A substantial demand for TDD spectrum exists (see our comments on § 20 General and §§ 58-65, 2500-2690 MHz).

This leads to the proposal to use this spectrum for New Advanced Wireless Services (IMT-2000) in TDD mode.

NPRM 58 – 65, 2500-2690 MHz

NPRM §58

This band is allocated in Region 2 on a primary basis to the Fixed, Fixed Satellite, Mobile except aeronautical mobile, and Broadcasting-Satellite Services. In the United States, this band is allocated to the Fixed service and is used primary by two non-Federal Government services, Multichannel MDS and ITFS. There are currently thirty-one 6 megahertz channels and one 4 megahertz channel, or 190 MHz of spectrum, allocated to MDS and ITFS in this band. About 2,500 MDS licensees transmit programming from one or more fixed stations, which is received by multiple receivers at various locations. ITFS stations are licensed on a site specific basis as was MDS originally. However, in 1996, the Commission awarded one geographic MDS license in each of 487 Basic Trading Areas ("BTAs").

NPRM §59

In general, the ITFS channels are grouped at the lower end of the band from 2500–2596 MHz and the MDS channels occupy the 2596-2660 MHz portion of the band. The remaining ITFS and MDS channels are interleaved in the portion of the band above 2660 MHz. MDS and ITFS operators typically operate in a symbiotic relationship, with MDS operators providing funding used by ITFS licensees for their educational mission in exchange for the extra channel capacity needed to make MDS systems viable. Today, most ITFS licensees lease excess capacity to MDS operators.

NPRM §60

Although the ITFS/MDS spectrum traditionally was used for one-way analog video transmission, the communications industry is rapidly taking advantage of Commission service rule changes to permit the use of the 2500-2690 MHz band for very high speed, fixed wireless broadband services. The Commission's July 1996, Digital Declaratory Ruling permitted licensees to utilize digital technology on the MDS and ITFS spectrum. With this Commission ruling and the advances in digital technology, ITFS/MDS video providers can now deliver as many as 200 channels of programming. In October 1996, the Commission allowed wireless cable and ITFS operators to use their spectrum for high-speed digital data applications, including Internet access. In 1998, the FCC approved the use of two-way transmissions on MDS and ITFS frequencies, effectively enabling the provision of voice, video, and data services. Today, approximately 25 companies are using MDS spectrum to offer high-speed Internet access in at least 43 markets, and several MDS licensees have announced plans to offer the service in additional markets. The initial filing window for two-way service occurred from August 14, 2000 until August 18, 2000 and approximately 2,267 applications were received. On November 29, 2000, we issued a Public Notice listing the applications tendered for filing, thereby triggering a 60 day amendment period. Absent petitions to deny, these applications will be granted after an additional 60 day period.

NPRM §61

In its 1998 Two-Way Order, the Commission established a regulatory framework under which MDS/ITFS can provide either one-way or two-way service to fixed or portable locations. MDS and ITFS licensees can reconfigure their licensed spectrum not only to change the direction of transmissions but also to change the bandwidth used in any direction. In these two-way systems, operators are able to deploy a cellular configuration to take advantage of frequency reuse techniques and to employ modulation schemes that would permit the use of variable bandwidth while assuring appropriate levels of interference protection to other licensed users of the spectrum. Further, the Commission's rules allow MDS and ITFS licensees to swap channels, subject to Commission approval. Finally, it should be noted that under certain circumstances, MDS entities could apply for licenses for up to eight ITFS channels per community, and ITFS entities have a subsequent right of access to those channels. As a consequence, MDS and ITFS spectrum use is an amalgam of different channels and geographic boundaries that vary from location to location.

NPRM §62

As noted above, the Commission is studying possible use of the 2500-2690 MHz band for advanced wireless systems. For example, the FCC Interim Report considered three band segmentation plans that could provide 90 megahertz of spectrum for advanced mobile and fixed communications systems while retaining 100 megahertz of spectrum for ITFS/MDS. The Interim Report concluded that large separation distances between 3G and ITFS/MDS systems are needed to allow co-channel sharing. The Interim Report also found that there are few geographic areas where incumbent systems are not operating, and that segmenting the band would raise technical and economic difficulties for incumbents, especially in their ability to provide service to rural areas. The band is undergoing further study, with a Final Report that will consider relocation options scheduled to be released in March, 2001. We request comment on all aspects of the FCC Interim Report.

NPRM §63

If spectrum in this band is made available for advanced wireless systems, we seek comment on allocating the spectrum for Mobile and Fixed services on a co-primary basis. An allocation for Mobile service would allow for additional flexibility in the use of this band, allowing the spectrum to be used for the introduction of new advanced mobile and fixed communications services, including 3G systems.

NPRM §64

We also invite comment on the public interest costs and benefits of adding a mobile allocation to these bands without any mandatory relocation. Consistent with our secondary markets initiative, are there any steps that the FCC should take to facilitate a secondary market in these bands to allow them to evolve to their highest valued use, whether that be fixed broadband, mobile applications, or some other use? Could current ITFS/MDS licensees reorganize their systems to continue providing current services and also offer new mobile services on a competitive basis with other wireless system providers, such as cellular or PCS? Could a portion of this spectrum be made available to new entities? If so which portion of the band and how much spectrum could be make available? How would reallocation of a portion of this band affect MDS operations at 2150-2160/2162 MHz band? We invite ITFS licensees to discuss whether adding a Mobile service allocation in the 2500-2690 MHz band would be beneficial to educators and, if so, how such operations could be utilized in an educational context. We also ask ITFS licensees to comment on what effect, if any, reallocation or relocation will have on their distance learning programs and overall educational mission. We also invite MDS licensees to discuss whether adding a mobile service allocation in the 2500-2690 MHz band would be beneficial to their plans for use of the band. In addressing these issues, commenters should take into consideration that 66 megahertz of this band has already been auctioned to MDS licensees and that the current MDS/ITFS sharing and leasing arrangements in this band are complex.

NPRM §65

If a portion of this band were to be made available for advanced services and incumbent users had to be relocated, we request comment on how incumbent users could be accommodated in other frequency bands. In particular, we request that commenters identify which frequency bands could accommodate incumbent MDS/ITFS services. If a portion of this band were made available for advanced services, either through reallocation or relocation, we seek comment on applying to incumbent users in this band the same relocation procedures that we decide to apply to incumbent users in the 2110-2150 MHz and 2160-2165 MHz bands. In particular, we request that commenters provide information about the type and the amount of costs to relocate incumbent MDS/ITFS operations. For example, could equipment be retuned or would facilities need to be replaced? What would be the cost to retune or replace equipment? We expect to rely on

some of the information filed in response to this Notice in conducting the second phase of the study on the 2500-2690 MHz band, which will focus on relocation options and the costs and benefits of such action.

Siemens Comments on §§58-65:

2500-2690 MHz

Siemens proposes to the FCC to allocate all available parts of the 2500-2690 MHz band for new advanced wireless services i.e. IMT-2000 services. Spectrum available in this band should be reserved for TDD applications in order to enable high data rates and highly asymmetric applications in densely populated areas.

The highest number of mobile users is found in urban densely populated areas. Here, highest bit rate demand and the greatest flexibility will be needed regarding asymmetric[5] traffic.
For such a demand structure TDD is superior to FDD in terms of flexibility and efficiency as shown by many studies.
The high frequency range of the 2.5 GHz band makes it very suitable for short range communication in city centers.
Siemens proposes therefore to use the whole band or a very large part of it for TDD in urban areas to enable New Advanced Wireless Services.
The table indicates the amount of traffic estimated for the urban and suburban environments based on UMTS Forum assumptions.

Table 7
Total Traffic in Urban and Suburban Environments

(Derived from population density)

		2005		2010	
		Down-link	**Up-link**	**Down-link**	**Up-link**
Urban	[Mbps/km²]	44	22	122	39
Suburban	[Mbps/km²]	1,7	0,3	11	1
Sum	[Mbps/km²]	45,7	22,3	133	40

Source: UMTS Forum Rapport No. 6
The calculations base on hexagonal cells with radius of 0,7/3 km urban/suburban in 2005 and with radius of 0,6/2 km urban/suburban in 2010. The equivalent cell areas are ca. 0,4/7,8 km² urban/suburban in 2005 and 0,3/3,5 km² urban/suburban in 2010

NPRM §66, Pairing Options

We recognize that the optimal use of the 1710-1755 MHz, 1755-1850 MHz, 2110-2150 MHz, 2160-2165 MHz, and 2500-2690 MHz bands for introducing advanced mobile and fixed services may be achieved by pairing these bands with one another or with other spectrum that has been identified for these services. As a way to focus this discussion, we solicit comment on several band pairing schemes discussed below as well as other spectrum pairing options, including those discussed in the FCC Interim Report. When evaluating pairing options, commenters should specify how much

[5] It should be noted that the most popular bitrates in ADSL are 768/128 kbit/s. This proves the highly asymmetric nature of Internet/Intranet access.

spectrum they believe will be required for advanced mobile and fixed communications systems from each band in each option addressed; the time period in which spectrum in the paired bands could be made available and whether those time periods are consistent with deployment plans; and whether the separation distance between the paired bands would impair the economical development of duplex equipment. Commenters also should address the following topics: the potential for sharing or segmenting the frequency bands to facilitate the implementation of advanced wireless systems; whether reallocation or relocation of incumbent users may be needed; and the identification of frequency bands to accommodate incumbent users that would have to be relocated.

NPRM §67, Pairing Option1

An option ("Option 1") for advanced mobile and fixed communications systems is our proposal in the Policy Statement; i.e., allocating the 1710-1755 MHz band paired with the 2110-2150/2160-2165 MHz band. A variation of this option could be to make spectrum available in phases in the 1710-1790 MHz band (similar to the second segmentation option discussed in the NTIA Interim Report), paired with additional spectrum above 2110 MHz. This option would be consistent with the proposal recently made to ITU-R Working Party 8F by Brazil, Chile, Guatemala, Mexico, and Venezuela that Region 2 countries use for 3G systems spectrum in part of the 1710-1850 MHz band (up to 60 megahertz) for mobile-to-base operations paired with spectrum in the 2110-2170 MHz band for base-to-mobile operations. As these countries note, this approach could permit compatible base-to-mobile use of the 2110-2170 MHz band among Region 2 and non-Region 2 countries to support global roaming. Accordingly, Option 1 could make available up to 90 megahertz of spectrum for advanced mobile and fixed communications systems and could also promote compatibility in the upper band. We note, however, that compatibility with non-Region 2 countries would not occur in the lower band if non-Region 2 countries use bands other than 1710-1755 MHz for 3G mobile-to-base operations.

NPRM §68, Pairing Option2

A second option ("Option 2") for accommodating advanced mobile and fixed communications systems is allocating the 1710-1755 MHz band paired with spectrum in the 1755-1850 MHz Federal Government band. As detailed in its Interim Report, NTIA has expressed serious reservations about using the 1755-1850 MHz band for non-Federal systems because of that band's use by critical Government systems. However, if NTIA were to make spectrum in that band available, it could be paired with the 1710-1755 MHz band on either a symmetrical or asymmetrical basis. The NTIA Interim Report suggests various band segmentation plans that could make 45 megahertz or more of spectrum available for advanced mobile and fixed communications systems. A symmetrical pairing might permit the 1805-1850 MHz band to be paired with the 1710-1755 MHz band, whereas an asymmetrical pairing would permit a larger block of spectrum in the 1755-1850 MHz band to be paired with the 1710-1755 MHz band. Option 2 would also have the potential advantage of permitting compatible Region 2/non-Region 2 use of the 1710-1755 MHz and 1805-1850 MHz bands because these bands are used in much of Europe for second generation GSM mobile radio systems. However, a disadvantage of Option 2 is that it is unclear whether European countries will transition these bands to 3G systems. A further disadvantage of Option 2 is that even if spectrum in the 1755-1850 MHz band is reallocated for non-Federal use, Federal satellite systems may continue to operate in that band on a grandfathered basis for a number of years in a manner that would limit the use of this band for advanced services.

NPRM §69, Pairing Option3

A third option ("Option 3") for accommodating advanced mobile and fixed communications systems is allocating the 2110-2150/2160-2165 MHz bands paired with spectrum in the 2500-2690 MHz band. Alternatively, the 1710-1755 MHz band could be paired with spectrum in the 2500-2690 MHz band. Option 3 would also permit either symmetrical or asymmetrical pairing. The potential advantage of this approach is that both the 2110-2150/2160-2165 MHz and the 2500-2690 MHz bands are available for 3G systems in many countries. Accordingly, Option 3 could directly permit 3G compatibility without concern as to whether 2G systems will be transitioned to 3G systems. However, a disadvantage of Option 3 is that it would require reallocation of ITFS/MMDS spectrum in the 2500-2690 MHz band, which could adversely impact broadband fixed use of that band, as detailed in the FCC Interim Report. A further disadvantage of Option 3 is that, while the 2500-2690 MHz band is potentially available for 3G systems in other countries, it remains unclear how many of these countries will actually use that band for such systems

Siemens Comments on §66-69:

Pairing Options, General

Siemens proposes to allocate 1710-1755 MHz (mobile TX) paired with 1805-1850 MHz (base TX) for New Advanced Wireless Services (i.e. IMT-2000).

The strategic advantages of this proposal are:

(1) It provides a reasonable paired band of up to 2 x 45 MHz for IMT-2000 to get started in the US and many other countries
(2) It allows compatible international roaming with a growing number out of 60 countries who will use this band from the beginning for IMT-2000 or transform it from 2G to 3G over time
(3) It allows true global roaming with the many countries using the original IMT-2000 core band[6] based on dual-band IMT-2000 terminals enabled by the similarity of the spectrum allocations
(4) A US adoption will be the catalyst for an evolution of the 1800 MHz band to another widely accepted IMT-2000 core band
(5) It limits the number of paired IMT-2000 core bands to two worldwide and allows cost effective dual-band mobile stations.

Siemens Comments on §67, Pairing Option 1:

1710-1755 paired with 2110-2150/2160-2165 MHz

As FCC noted, this proposal would - even if adopted in Region 2 - not allow single band roaming with non-Region-2 countries since these countries pair the 2110-2170 band with 1920-1980 MHz. In addition it is not clear whether all Region 2 countries adopt this proposal. It should therefore not be adopted in the US.

Siemens Comments on §68, Pairing Option 2:

1710-1755 MHz paired with 1755-1850 MHz

1710-1745 paired with 1805-1880 MHz is used in 60 countries around the world (not only in Europe) in parts or completely for GSM 1800.

The 1800 MHz band is designated by the ITU as a paired IMT-2000 extension band. Countries who use it partially for GSM 1800 can begin immediately to allocate parts for IMT-2000. In countries who have allocated it completely to 2 or 3 GSM operators it may be successful to convince the operators to convert the band in steps to IMT-2000 ("voluntary re-farming"). Other countries indicated their intention to re-farm the 1800 MHz band. This may be a more long-term process.

This band has the potential of a soft evolution towards a second IMT-2000 core band in addition to the 1920-1980/2110-2170 MHz band. Therefore this band has the potential to be used for IMT-2000 in many countries by a high number of users. This allows low cost equipment and low cost roaming.

The emerging scenario of two IMT-2000 core bands with similar radio parameters enables the cost-effective development and production of dual-band IMT-2000 terminals for easy cost-effective global roaming between all countries.

[6] 1920-1980 paired with 2110-2170 MHz

In order to allow this to happen, the allocation must of course maintain the RX/TX separation of 95 MHz and the mobile TX/base TX usage. The available bandwidth could reach up to 2x45MHz.

Table 8
2G Use of 2x75 MHz in 1,8GHz Band identified for IMT-2000 by WARC200 and 3G spectrum Availability

Regions	Americas (34 countries)		Europe (43 countries), Asia/Pacific (30 countries), Africa (31 countries) [x]				
Countries #	33	1	7	9	9	17	62
Licenses per country	0	3	≥4	3	2	1	0
% of spectrum occupied by 2G	0	30	100	75	50	25	0
% of spectrum could be designated for 3G	80[xx]	50 [x]	0	25	50	75	100

[x] Americas – CITEL, Europe – CEPT, Asia/Pacific -- APT, Africa – in organization process

[xx] due to PCS band plan

In the most of 148 countries there is real potential to use the 3G technology in the GSM1800 bands. It would help to fulfill the world wide roaming task.

Siemens Comments on §69, Pairing Option 3:

2110-2150/2160-2165 MHz paired with 2500-2690 MHz,
alternatively 1710-1755 MHz paired with 2500-2690 MHz

The first sub-option (2110-2150/2160-2165 paired with 2500-2690) would not allow roaming with single-band terminals since only one link would be common with countries using 1920-1980 paired with 2110-2170 MHz. Therefore this sub-option should not be adopted.

The second sub-option (1710-1755 paired with 2500-2690 MHz) would cannibalize two bands designated by the ITU for IMT-2000, the 1800 MHz and the 2500 MHz band:

(1) This sub-option would consume a large part of the mobile TX band of the 1800 MHz band (1710-1785 paired with 1805-1880MHz). It is used in more than 60 countries for GSM 1800 today. Many countries will probably transform this spectrum to IMT-2000. This sub-option would prevent a cost-effective roaming between the US and such countries. Therefore this sub-option should not be adcpted.

(2) This option would cannibalize in addition the 2500-2690 MHz. It would prevent a cost effective roaming between the US and other countries. Therefore this sub-option should not be adopted.

(3) Handset implementation, in particular handset antenna design could be difficult and expensive due to the larger duplex spacing (close to 400MHz).

NPRM §§70-86

Siemens Comments on §§70-86:

Noted

CONCLUSION

Siemens Corporation appreciates the opportunity to provide its views on the important questions confronting the FCC. We believe that the Commission goals in this proceeding will be most effectively achieved by choosing the 1710-1755 band paired with 1805-1850 MHz for the core band in FDD mode. For the TDD mode in the USA, we support using the 2110-2150/2160-2165 MHz spectrum and the available parts in the 2500-2690 MHz band.

Respectfully submitted,

SIEMENS CORPORATION

Gregg Ward
Vice President
Government Affairs

Mark Esherick
Director, IT and Telecommunications

Siemens Corporation
701 Pennsylvania Avenue, NW
Suite 720
Washington, DC 20004

Phone: +1 202 434-4803
Fax: +1 202 347-4015
Email: Mark.Esherick@sc.siemens.com

Christoph Legutko
Director, Frequency Management

Siemens AG, ICM N BO
Hofmannstr.51
D-81359 Munich
Germany

Phone: + 49 89 722 26337
Fax: +49 89 722 48290
E-Mail: christoph.legutko@icn.siemens.de

Siemens expects that 50% of US Internet users (currently ca.120 Mio.) will in future use wireless mobile access.

Siemens Comments on § 20 Question 2:

Offerings percentage for fixed and mobile service in the future

The USA has today the following service penetration rates: fixed Internet 43%, mobile networks 39%. The number of Intranet users is assumed to be in the order of 10%, related to the US population. If we consider wireless service access in the wide area networks only (no wireless LAN, no MDS) we estimate for the long term future approximately 50% of all internet users as being mobile and the other 50% (including the intranets) remain fixed.

Today most mobile non-voice applications are underdeveloped. But we see early mass-market successes: The Short Message Service and the mobile Internet Access with i-mode and WAP are frontrunners of the mobile multimedia revolution. A very high growth of all non-voice services is expected in the medium term.

Siemens Comments on § 20 Question 3:

Actual technological limitations for advanced services

In principal Siemens sees no technological limitations to serve the emerging market of New Advanced Wireless Services. The existing 2G systems had limits e.g. in high-speed services. Therefore new radio transmission techniques had to be developed and standardized. The most serious obstacle for new high speed in several markets is the lack of sufficient much spectrum available at reasonable cost.

Siemens Comments on § 20 Question 4:

Time period for introduction of new services

Most service providers in the GSM and ANSI 136 world plan the introduction of fast packet data services during 2001/2 and faster Third Generation Services with higher capacities during 2002/3. In total 80 licenses for IMT-2000 have been awarded by national regulatory authorities. Fast decisions in the US are needed in order to keep the US in the forefront of the mobile evolution.

Generally speaking, we observe that service providers introduce new services as soon as possible for two reasons: differentiation in competition and creation of additional revenue streams.

Siemens Comments on § 20 Question 5:

Market studies

The service providers perform very thorough market studies but do not publish them.

The key findings of a Siemens survey of October November 2000 are summarized in the comments to §20 question 1. See all survey results in attachment.

Other sources are the market studies published by the UMTS Forum (Report No. 8 and 9) available from: www.umts-forum.org.

Siemens Comments on § 20 Question 6:

Licensees are needed to accommodate market demand

In Europe and elsewhere it has proven beneficial for a rapid market development and a universal nation wide service offering to issue national licenses.

In most countries outside the US licenses have been issued for the use of a IMT-2000 system. The operator was entitled to choose which IMT-2000 system he wanted to use. All these licenses were nation-wide. This enables a rapid IMT-2000 deployment and global roaming.

Since competition is beneficial for a healthy market development and a duopoly is often not very efficient, at least three licenses should be issued per license area in the US. On the other hand it must be considered to allocate a sufficient minimum bandwidth per operator to allow an efficient network built out with sufficient capacity (see UMTS Forum Report No. 5 on "Minimum Spectrum Demand per UMTS Operator", see www.umts-forum.org.) Therefore Siemens thinks 3 - 4 licenses per market is the optimum.

NPRM §21, IMT-2000 Radio Interface Standards

We noted above that the ITU has adopted a set of five radio interface standards for IMT-2000. These standards have a wide variety of channel bandwidths among them ranging from 30 kilohertz to 5 megahertz. The Commission traditionally has taken a flexible approach to standards and generally does not mandate a particular type of technology, leaving such an outcome to the marketplace. As an example, there are several standards being used for PCS, such as CDMA, TDMA, and GSM. We anticipate that a similar approach would occur with the onset of advanced wireless services. Therefore, we seek comment on whether the IMT-2000 radio interface standards constitute a sufficient set of standards for planning advanced wireless system spectrum requirements or whether service providers are contemplating other standards for advanced wireless system use.

1. *Are the data rates of the IMT-2000 interfaces sufficient to meet projected service offerings and demand?*
2. *To what extent will service providers offer bandwidth on demand or will all services be provided with fixed bandwidth?*
3. *What data rates need to be accommodated on the upstream and downstream sides, and what ratio of upstream to downstream bandwidth will be needed?*
4. *What are the advantages and disadvantages of various methods (e.g., Time Division Duplex ("TDD") operation, variable modulation, variable frequency block allocation, variable duplex spacing) to accommodate asymmetric traffic?*
5. *Are there any significant developments anticipated in the standards context that might affect our spectrum allocation decisions?*

Siemens Comments on §21, Question 1:

Data rates for the IMT-2000

The IMT-2000 radio interfaces can offer up to 2 Mbit/second to the user. In the beginning the operators plan to offer bit rates of up to 384 kbit/s for pedestrian users an up to 144 kbit/s for users in cars. Siemens thinks that the bit rates offered by IMT-2000 are a major step forward and will serve the market demand for the foreseeable time. They are sufficient to offer mobile multimedia services including Internet and Intranet access for the next 2-3 years.

Siemens Comments on §21, Question 2:

Bandwidth on demand or fixed bandwidth

New Advanced Wireless Services will include the ability to offer bandwidth on demand. The trend is that service providers are going to offer packet data transport within the emerging 3G services. In order to meet the upcoming varying services demand (data rate, traffic asymmetry, quality, wireless Internet) a flexible resource allocation is needed.

Siemens Comments on §21, Question 3:

Data rates and asymmetry ratio for upstream and downstream

The necessary data rates depend on the service type. Many service types like e-mail download or web surfing are asymmetric.

As the trend of IMT-2000 services is going towards packet transport, the individual service bit rates will be aggregated on the upstream and downstream side. Thus - in both radio transmission modes (FDD + TDD) a traffic mix of various service bit rates depending on their usage will determine the amount of spectrum needed. Service use will vary depending on day time and business/residential environments, with consequently changing traffic asymmetry ratios. The table below shows the bit rates and asymmetry ratio for typical 3G services, however, the service will be dominated by voice, e-mail/ messaging, WWW and audio/video download. As a conclusion we assume varying asymmetry ratios across environments and changing over time.

Table 3
Data rates and traffic asymmetries for 3G services

3G Service Type	Data Rate [kbps]		Asymmetry Ratio Downlink : Uplink
	Downlink	Uplink	
Voice	7 16	7 - 16	1:1
Videophone	128 - 384	128 - 384	1:1
Messaging (E-mail without attachment)	≤ 64	16	3:1
Remote camera	16	128 - 384	1:20
Document transfer	≤ 384	≤ 384	30:1 / 1:30
Info/WWW	≤ 2000	≤ 128	6:1
FM radio	128	16	50:1
Audio streaming[2]	128	64	10:1
Video on demand	≤ 2000	16	100:1
Video streaming[3]	≤ 600	64	10:1

[2] via Portal
[3] via Portal

Siemens Comments on §21, Question 4:

Advantages and disadvantages of methods to accommodate asymmetric traffic

3G Radio Interface Technologies
Methods to provide asymmetric traffic capability

Basically three different techniques to provide asymmetric traffic capability can be distinguished:

1. Time Division Duplex (TDD):

Forward and reverse links are accommodated in the same piece of (unpaired) spectrum, the transmitted information is arranged in a fixed radio frame, directions of transmission are separated in time and handled sequentially in dedicated time slots. Capacity can be divided between forward and reverse link over a wide range, with granularity resulting from the structure and length of the TDD frame.

2. Frequency Division Duplex (FDD):

2.1. Symmetric FDD (Standard):

Forward and reverse links are accommodated in different pieces of (paired) spectrum, normally of equal width. With symmetric modulation/coding only symmetric (identical) traffic capabilities for forward and reverse links are possible.

2.2. FDD with asymmetric modulation/coding:

FDD-operation in paired bands of equal width but different modulation formats for forward and reverse links can provide some capability for asymmetric traffic, preferably for more forward link traffic. The maximum level and direction of asymmetry is basically fixed and limited by equipment design.

2.3 FDD with asymmetric spectrum allocation for forward and reverse link:

FDD-operation in paired spectrum with unequal width of bands for forward and reverse links, either in contiguous bands or in a multitude of channels, can provide some capability for asymmetric traffic, with a small and fixed range and direction of asymmetry.

Prerequisite(s) to be provided by the FDD equipment is the capability for variable duplex spacing between paired channels of equal width and, for unequal channel widths, multi-rate/ multiple bandwidth capability.

Table 4
Advantages and disadvantages of the various methods to provide for an asymmetric traffic capability

Method	Advantages	Disadvantages
1. TDD (UTRA)	- **unpaired** spectrum used , - **high flexibility with respect to level and direction of traffic asymmetry,** - **no relation between spectrum and actual asymmetry,** - capacity increase by easy implementation of adaptive antennas, - standardised	- synchronisation of neighbouring cells (clusters) required, - isolation between adjacent channels required, - pulsed mode of operation, - range limitations due to guard times in frame structure (preferably micro and pico cells)
2. FDD	- CW operation, - wide coverage, range primarily limited by system margin only, - no particular requirements for adjacent channel isolation - standardised	- **only paired spectrum with minimum centre gap necessary,** - **no flexibility, fixed direction (DL/UL)** - **fixed relation between spectrum and traffic asymmetry** - traffic asymmetry impacts spectral efficiency - implementation complexity
2.1. FDD with asymmetric modulation/coding	- symmetrical paired bands, - no additional allocations required	- influence of direction on system margin - **interference sensitivity becomes asymmetric,** - **more complicated planning and implementation,** - not yet standardised
2.2. FDD with asymmetric spectrum allocation	- flexible pairing possible, - standardised	- **fixed asymmetrical paired spectrum ,** - Capability for flexible and dynamic duplex spacing needed, - implementation complexity, - Multi-rate, multiple bandwidth capability for channels of different width required

Siemens Comments on §21, Question 5:

Standards developments may affect spectrum allocation decisions

All significant developments of standardization processes are visible. The standardization is at present in a phase where the details are elaborated. We do expect that the new standards give the maximum flexibility for spectrum allocations, unpaired or paired. The actual standardization status allows producing state of the art equipment.

NPRM §22, 1G/2G Systems

We also seek information regarding the ability of existing 1G and 2G systems to use currently licensed spectrum to provide advanced services. We note that capacity limitation is among the most important factors determining the types of new services that can be offered within a specific time frame. For example, if sufficient capacity exists, a service provider could implement advanced wireless services on a portion of their spectrum, transition existing subscribers, and upgrade cleared spectrum to advanced wireless services

Siemens Comments on §22:

1G/2G Systems

The potential of 1G analogue systems for new advanced services is very limited. Their spectrum is often heavily loaded. The low carrier bandwidth does not allow high user bit rates. The multiplexing of several carriers is expensive.

The digital 2G systems have more potential. As an example GSM and ANSI 136 allows packet and high bit rates data transmission:

- Combination of several timeslots of a TDMA carrier for high speed circuit switched connections (HSCSD = high speed circuit switched data service)
- Use of every timeslot of the TDMA frame of a radio carrier for packet switched services. (GPRS = General Packet Radio Service).
- The introduction of advanced channel coding and modulation and the combination of several time slots of a radio carrier allows bit rates of up to 384 kbit/s (EDGE = enhanced data rates for the GSM evolution).

In addition 2G systems can be enhanced by advanced service functions like a micro browser, the SIM toolkit or CAMEL a feature package for service creation and portability.

Advanced 2G digital systems have a potential to introduce new advanced wireless services, if the service provider has a sufficient spectrum allocation.

NPRM §23, Existing Systems Usage

Siemens Comments on §23:

Noted

NPRM §24, Global Roaming

Global roaming, which would allow consumers to use the same phone anywhere in the world, has been one of the objectives for 3G and IMT-2000 systems. To facilitate roaming, either common spectrum or multi-band phones must become available.

1. *What steps can we or should we take to facilitate global or regional roaming?*
2. *What percentage of and what type of U.S. or foreign consumers need access to global or regional roaming?*
3. *What roaming applications are required?*
4. *How can these requirements best be met – e.g., common roaming frequency bands within the Americas, common roaming band with Europe and Asia?*
5. *With respect to multi-band devices, how much more expensive are they than single-band devices and how many different frequency bands can be supported by current equipment?*
6. *How wide a frequency range can be supported by existing equipment?*
7. *Would new equipment have to be designed and when would it be available?*
8. *How are economies of scale and complexities of deployment impacted if two, three, four or more different spectrum plans are adopted in different parts of the world?*

Siemens Comments on §24:

General

Siemens thinks that global roaming is extremely important for US private and business customers since it is very popular with users and in order not to be isolated in the world. Therefore all steps should be taken to enable global roaming by seeking commonalties within the IMT-2000 family systems. Here spectrum harmonization is the most important single measure. Even if a full harmonization cannot be reached the reduction of the number of bands, identical or similar RX/TX separation etc. are important commonalties to enable the cost effective development and production of terminals.

Global roaming is a key target of the IMT-2000 strategy agreed by all participants world-wide already in the late 80s. During the standardization work it became clear that one common radio and one common core network specification was not achievable at global level due to different market needs and different business interests. In the light of this situation the IMT-2000 family of systems concept was agreed. In this strategy it is key to strive for commonalties in order to enable global roaming. For this purpose the harmonization of spectrum is economically more important than the harmonization of many other parameters like network protocols or the chip rate of different wide-band CDMA radio interfaces[4].
The most successful example is global roaming provided by GSM (Global System for Mobile Communications). Systems following this standard are implemented in more than 140 countries. Every GSM network operator offers international roaming. More than 20.000 roaming agreements are signed and have lead to working roaming relations. Larger operators have roaming working with more than 100 other foreign networks. International roaming is extremely popular with customers. In many networks the international roaming traffic is more than 10 % of the total traffic. In August 99 more than 400 million calls were originated by roamers in visited foreign networks. Roaming is also available for data services including the Short Message Service. International roaming will be a feature of new advanced wireless services like GPRS and UMTS. The Japanese will join this roaming world in the Third Generation.

GSM uses a uniform functional specification and harmonized spectrum allocations globally. The mass of the traffic uses a duplex allocation in 900 MHz, a smaller share uses the 1800 MHz and 1900 MHz bands. Dual band phones 900/1800 and 900/1900 as well as triple band phones 900/1800/1900 are available. Roaming exists between networks working in the different frequency bands. There are firm plans for GSM/UMTS multi band/dual mode phones and roaming between GSM and UMTS.

Siemens Comments on §24, Question 1:

Steps towards facilitating global roaming

FCC should actively encourage the service providers and manufacturers to co-operate to enable global and regional roaming.
FCC should attribute a very high priority in the spectrum allocation to enable global and regional roaming.

[4] Joint contribution of Motorola and Nokia to ETSI Technical Committee SMG (SMG 779/98)

Siemens Comments on §24, Question 2:

Need of U.S. or foreign consumers for access to global roaming

Practically all US business people travelling abroad need access to mobile communication services for their business. They need to be reachable. They must be able to communicate and to be reached, they need access to the Internet and the company's Intranet wherever they are. This is needed in order to perform their business efficiently and to be competitive, since the rest of the world enjoys these features as inherent to GSM and UMTS.

Practically all US private travelers use mobile communications on their travels in the US and would not like to loose these feature, when they are abroad. It should also be considered that many people see these communication means as an important tool to secure their personal safety. Many US citizens might see this more relevant when they are abroad in unfamiliar situations and environments. This is especially important in emergency cases. For 3G there are standards on the way to achieve a global solution.

The US service providers would like to offer these services to incoming foreign roamers. This can be considered as services export.

This the first time with 3G that an international roaming built on principles like in GSM roaming is the only convenient way to use such services abroad, since the customer does neither need to enter into contractual relations with foreign operators nor to exchange the terminal. He remains reachable under his home telephone number.

Siemens Comments on §24, Question 3:

Roaming applications

The most important applications are:
- Internet/Intranet access: mainly www and email,
- Security applications and emergency calls,
- mobile commerce,
- telephony.

Siemens Comments on §24, Question 4:

Fulfilling of roaming requirements

(1) FDD mode of operation in paired bands

The existing realities of spectrum allocations must be respected. It is however possible to design an evolution process which enables cost-effective global roaming. One cornerstone are the existing eighty IMT-2000 licenses in the original ITU IMT-2000 core band. It is not possible to free these bands in the US and other American counties who have implemented the PCS concept.

This situation requires the use of multi-band technology. Such a multi-band technology can be applied to each IMT-2000 family member. I.e the functionality remains unchanged. Therefore no multi-mode technology is needed per IMT-2000 family member. In order to be cost effective the number of bands should be limited. Ideal would be the use of only one additional band, which would then become a second IMT-2000 core band.

Fortunately the potential for this solution exists. The band of 1710 - 1755 MHz (mobile TX) paired with 1805 - 1850 MHz (base TX) can serve for this purpose. It is already a part of the ITU designated IMT-

2000 bands. In many countries it is used for GSM1800 already today. They plan to re-farm it long-term for IMT-2000. In many of these countries only a part of the band is used for GSM1800 and the rest can be freed immediately. In all countries using PCS this band can be allocated to IMT-2000.

(2) TDD mode of operation in unpaired bands
For TDD operation in unpaired bands strong efforts should be made to harmonize a part of the 2.5 GHz band worldwide.

Siemens Comments on §24, Question 5:

Multi-band devices

The additional terminal cost depends at first on the market volume. The electronics and filter technology together with their integration level continuously develop and should compensate the cost increasing caused by higher terminal complexity.

The present GSM market is 500 million units per year in 2001. In such a case additional cost of dual band GSM 900/1800 terminals using harmonized spectrum allocations and a uniform specification is negligible. Today practically no GSM900 and 1800 single-band units exist any more. The GSM900/1800 dual-band handset is the low cost standard equipment in GSM. Due to actually the low market volume the GSM900/1900 dual-band and the GSM900/1800/1900 triple-band handsets are substantially more expensive.

Current Siemens equipment supports GSM 900/1800 or GSM 900/1800/1900. Siemens develops triple-band GSM and triple-band GSM/ANSI136 handsets.

Siemens Comments on §24, Question 6:

Frequency range supported by existing equipment

The market has shown, that up to three different frequency ranges are already implemented from a technology point of view - however, it has also shown, that the number of countries and their sizes highly influence the economy of scale.
Siemens delivers GSM 900/1800 and GSM 900/1800/1900 terminals and in future multi-standard terminals. The first 3G/ terminals will be dual standard (3G/GSM) and will cover band segments from 900 MHz up to 2.1 GHz. The future developments could also comprise the extension band at 2.5 GHz .

Siemens Comments on §24, Question 7:

Design and availability of new equipment

The 3G equipment with 2G compatibility is already under development following the available standard specifications.

Siemens Comments on §24, Question 8:

Economies of scale and some different spectrum plans

The mobile market development in the last two decades has proven, that globally harmonised spectrum is of eminent importance for the economy of scale. The main example is the 806 - 960 MHz band - used by AMPS, DAMPS, TACS, GSM, PDC and IS-95. A huge majority of mobile users today are in this band,

probably more than 90 % world-wide. This fact brings down costs and helps for global roaming taking a main obstacle away from the many differences in the technologies. Not only industrial, but mainly developing countries benefit from such harmonisation. This will help in future to reduce "Digital Divide". The market has also shown, that up to three different frequency ranges would be acceptable from a technology point of view - however, it has also shown, that the number of countries and their sizes highly influence the economy of scale.

Europe, Asia (without Japan and Korea) and Pacific have a harmonized spectrum allocation for 2G (GSM) and move towards a harmonized spectrum allocation for 3G (UMTS) based on ITU recommendations. Japan and Korea join this club now for the Third Generation. It is of crucial importance for the US to enable a harmonized and coordinated IMT-2000 implementation in order to generate volume for terminals and networks and to reduce the complexities of roaming scenarios.

NPRM §25, Additional spectrum

The fundamental issues in this proceeding are the amount of additional spectrum that should be made available for use by new advanced mobile and fixed services, including 3G systems, and the frequency bands in which this spectrum should be located. The ITU has identified a number of frequency bands that could be used for advanced mobile and fixed communications services, including 3G systems. Some of these bands already are used in the United States for 1G or 2G wireless systems that may transition to advanced wireless systems over time. Consequently, this NPRM will focus primarily on additional frequency bands for possible use by advanced mobile and fixed systems, including two frequency bands that are not currently available for non-Federal Government use. We have included these bands in our analysis in order to develop a complete record on all possible frequency bands for new advanced mobile and fixed systems. We expect that the record developed in response to this NPRM will inform our decisions on the amount of spectrum to allocate or designate from each candidate band for advanced wireless systems.

Siemens Comments on §25:

Spectrum evolution

Siemens strongly supports an evolutionary process moving ahead in implementable steps. The most urgent step is to allocate the band 1710-1755 paired with 1805 - 1850 MHz as an IMT-2000 core band for FDD operation. This would allow to build dual band terminals, which use the original IMT-2000 core-band at 2 GHz together with this band for cost effective dual-band terminals enabling global roaming for the US customers. Then the unpaired spectrum in the 2110-2150/2160-2165 MHz band and the spectrum available in 2500-2690 MHz band should be allocated for TDD operation as extension bands providing capacity for flexible use and high speed services in densely populated areas. For more details especially on the total demand of new spectrum see our comments on § 27.

NPRM §26

Siemens Comments on §26:

Noted

NPRM §27, Spectrum Requirements

We believe that today and historically the introduction and continued growth of advanced mobile and fixed services requires that additional spectrum must be made available.

1. *We solicit comment on how much additional spectrum should be made available to facilitate the introduction of these services.*

In addressing this issue, commenters should take into account and address the advanced wireless system characteristics that need to be accommodated, as discussed above:

2. *current capacity restraints on providing specific types of advanced services;*
3. *market surveys or projections on expected demand and growth of advanced services;*
4. *and any other technical requirements for efficient use of spectrum that may be used to deploy advanced wireless systems.*

We note, however, that it is not Commission policy to set aside a certain amount of spectrum restricted to a given technology – such as 3G. Instead, we intend to identify a flexible allocation for the provision of advanced wireless services, informed by our spectrum management policies and the spectrum needs as developed in this proceeding.

5. *In this context, we ask commenters to address a number of specific issues.*

Siemens Comments on §27, Question 1:

Spectrum requirements

Table 1 provides a summary of year 2010 spectrum requirements for services that are considered to be current wireless services and year 2010 spectrum requirements for new third generation services to be provided by IMT-2000 systems. According to the ITU definitions of services, current services include speech (S), simple messaging (SM), and switched data (SD) services. New IMT-2000 services include medium multimedia (MMM), high multimedia (HMM), and highly interactive multimedia (HIMM).
For example, in examining the Region 2 totals, it is observed that the current services (S, SM, and SD) require a total of approximately 174 MHz for the year 2010. In some administrations in Region 2, the current allocation for these services is approximately 190 MHz.
Therefore, the wireless industry for these administrations in Region 2 may be able to accommodate future growth of existing services with the current allocation assuming the air interface is changed to incorporate the more efficient and higher capacity IMT-2000 technology. Table 1 also shows that the spectrum requirement for these same administrations in Region 2 for new higher data rate services (MMM, HMM, and HIMM) totals approximately 216 MHz. It is clear from the table below that the additional terrestrial spectrum requirements are driven by the new wide-band services, namely, highly interactive multimedia, high multimedia, and medium multimedia.

Table 5
Global mobile terrestrial spectrum requirements by service classes for year 2010

	1G and 2G services (speech, simple messaging and switched data) [MHz]	3G new services (medium multimedia, high multimedia and highly interactive multimedia) [MHz]	Total spectrum requirements [MHz]
Region 1	269	286	555
Region 2	174	216	390
Region 3	232	248	480

NOTE:
1. It is recognized that 3G services includes the 1G and 2G services, but this table is constructed to delineate the higher data rate 3G services spectrum requirement from the speech and lower data rate services spectrum requirement.
2. Source: ITU Doc. 8/80-E: SPECTRUM REQUIREMENTS FOR IMT-2000, 26 April 1999

Due to history the 3G spectrum is mainly paired and most of it has been allocated for FDD operation. The start of 3G systems with FDD is necessary because of the FDD advantages for wide area coverage with macro cells, which is a duty to be fulfilled by operators. The services offer in such an environment mostly low or medium bit rates. Uplink and downlink are symmetrical. The subscriber density will be rather low or medium. This leads to levels of revenues, which may be not high enough for financing the 3G networks and services.